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THE ORGANIZATIONAL CONTEXT OF HIGHER ORDER THINKING

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ABSTRACT

Over the past several years, one study after another has uncovered a positive relationship between interpersonal interaction and individual achievement. According to a handful of these studies, interaction is more effective than are individually-based strategies for promoting reasoning. We give our attention here to the link that possibly exists between interactional processes and the development in secondary school students of complex, non-algorithmic ways of thought. Concretely, we aim to (1) identify the characteristics of classroom interaction that should bear most directly on the kind of thinking one would find among students in that classroom; (2) describe the context within which the given characteristics can evolve and thrive; and (3) indicate the issues deserving more systematic study, if we are to understand the context of complex thinking.

THE ORGANIZATIONAL CONTEXT OF HIGHER-ORDER THINKING

INTRODUCTION

Recent analyses of American secondary schools offer a similar portrait, a portrait that shows teachers and students engaged in activities too routine to require substantial involvement or engender inquisitiveness. The image prompts concern, at least in part, because it contrasts so sharply with the model of education thought appropriate for the contemporary world. Rapid changes in occupations signal a need for high school graduates with well-developed problem solving skills and the ability to continue to learn. To some analysts, weaknesses in the curriculum do more than affect the individual student; they may influence international competitiveness. Willoughby is only one of several observers who suggest a link between emphases in schools and economic productivity: "On the basis of evidence being accumulated, it seems that Japan is putting more emphasis on teaching thinking. . . than has been the case in the past, while America, with the back-to-basics movement, has been deemphasizing thinking in favor of inappropriate skills" (Stephen Willoughby, cited in Henderson, 1984: 7).

Willoughby points to the topic that is of concern in this paper: the emphasis on thinking. Our purpose is not to document the rarity with which thinking seems to take place in classrooms, for others already have done so. Instead, we consider the kinds of contexts in which thinking

might thrive. We assume that some settings prove more conducive to cognitive development than do others. Our aim is to describe such settings, using as our basis the literature on higher order cognition as well as that on groups and organizations.

Most of the explanations for the limited attention given to thinking focus on the individual. One strand, based in developmental psychology, treats the emergence of higher-order thinking as a somewhat gradual process, one that can unfold only as the person matures. Lochhead, for example, contends that "students may not be ready to internalize the kinds of active learning strategies that we would like them to master until their second or third year in college. Thus, if students are to become fully competent as active learners, it would appear necessary to extend the emphasis on active learning from the primary grades into high school and college" (1985: 128. For a critique that higher order thinking depends heavily on maturation, see Keating, 1986). A different strand locates the problem in the attitudes, knowledge, or predispositions of teachers. Langer and Applebee maintain that in their search for identifiable indicators of progress and success teachers give greater attention to content than to ways of thinking. Teachers look for "the facts or information out of which arguments may be constructed, rather than the reasoning skills needed to construct such arguments. . ." (1986: 5).

We begin with the premise that learning is an interactive process. Learning depends, thus, not only on the characteristics of the participants in that process but also the arena. The arena encompasses both the classroom

and the wider school. By delineating the conditions at both levels that should matter, we hope to offer a framework for research and analysis that would move us beyond models based exclusively on the individual.

HIGHER-ORDER THINKING AND THE CLASSROOM

The classroom is the part of the arena that bears most directly on student learning. We turn momentarily to classroom processes, after discussing our use of the term, "higher-order thinking."

On the Meaning of Higher-Order Thinking

The description on which participants in the higher order thinking project have converged serves as the basis for this discussion: "Higher order thought occurs when an individual must interpret, analyze or manipulate information, because a question to be answered or a problem to be solved cannot be resolved through the routine application of previously learned knowledge." Higher-order thinking parallels what others have termed reasoning: "an inferential process by which an individual reaches a conclusion" (Voss, 1985).

Resnick (1986) asserts that higher-order thinking is difficult to define but easy to recognize. Among its characteristics:it is non-algorithmic -- the lines of arguments cannot be specified fully in advance; complex -- there need not be a single starting point; and demanding -- considerable effort is required. The details may vary from one source to the next, but most definitions converge on the theme that higher-order thinking involves going beyond the facts.

Higher-order thinking is not identical to what some have termed, "critical thinking." Critical ability refers to an ability to recognize stereotypes, biases, and value orientations; it places greater weight on the judgments made than on the lines of reasoning pursued. At least one similarity can be noted between higher-order and critical thinking: both stress the importance of an analytical frame of mind.[1]

Higher-Order Thinking and Interaction

Two different research streams offer suggestions on the contributions that interaction can make to learning in general: studies on teacher expectancies, and analyses on cooperative learning groups. The second stream implies as well that cooperation enhances the ability to move beyond rote memorization.

Teacher expectancies and student learning. In the late 1960s Rosenthal and Jacobson (1968) set forth an argument that was to generate considerable controversy and subsequent research: the expectations that teachers hold for students affect directly what students learn. By 1985 Harris and Rosenthal (1985) were able to count over 400 studies that tested the hypothesis: the higher the level of teacher expectations for a student, the better the student's performance. The studies set forth four explanations for the connection between expectancies and performance. First, teachers tend to display greater warmth towards the students from whom they expect good work than towards other students. Second, the "high-expectancy" students get more differentiated feedback: they are told not only whether their response is incorrect or correct but what makes

it so. Third, teachers present more material and more difficult material to the students for whom they have high expectations. Finally, "high-expectancy" students are given more opportunity than are others to respond to the teacher.[2]

We cite this literature because of the association it reports between level of interaction and level of performance. Supposedly, students for whom teachers hold favorable views have more of a chance than do other students to interact with their teachers about the subject matter. The literature highlights the importance of interaction for learning, but it does not distinguish among levels of learning. It is the research on group cooperation that addresses more specifically the matter of interaction and the learning of higher-order reasoning.

Cooperation and learning. Analysts long have been interested in the connection between group conditions and individual performance. To the lengthy list of studies on groups in varied settings can be added the rather extensive literature on classroom groupings and student learning. A cursory reading of that literature would show possible contradictions. Michaels (1977), among others, insists that competition rather than cooperation promotes achievement; Sharan (1980) takes the opposing viewpoint. Johnson and Johnson (1975) contend that for learning, group efforts are more influential than are individual-level efforts; that is not the conclusion from Ryack (1965).

On closer scrutiny, one finds more consensus than disagreement, for the effectiveness of the group depends -- at least in part -- on the task. Cooperation has positive effects if the individuals involved must produce

a group product. Even more important for our purposes: cooperation produces better outcomes than does individual effort for tasks involving verbal problem-solving and the grasping of concepts (Johnson, et al., 1981, and Skon et al., 1981)

Skon, Johnson and Johnson (1981) offer one of the most direct tests of the hypothesis that cooperation is more likely than is individual effort to enhance cognitive development. The researchers assigned first-grade pupils in a selected school to one of three conditions: a competitive condition, in which group members were instructed to compete for a set of rewards; a cooperative condition, where full group participation was set as the standard; and an individualistic condition, where students had to work alone. Whatever the condition, students were to carry out a set of activities that required them to categorize materials that later could be retrieved; to paraphrase and explain a set of metaphors; and to solve a group of word problems in mathematics. Cooperation was particularly beneficial for the categorization task. There was a tendency, too, for the students in the cooperative groups to surpass those in the competitive groups and those who worked alone on the second task: paraphrasing. Finally, "students who discussed math problems with peers within a cooperative context were better able to set up the equations. . .than were peers working in the competitive and individualistic conditions." (p. 90). The authors reach this conclusion:

> The results of this study corroborate previous research that indicated cooperative peer interaction promoted higher cognitive reasoning in solving conservation and concept-attainment tasks The extension of these findings to categorization and retrieval tasks, language

> acquisition tasks, and mathematical reasoning tasks considerably strengthens the conclusion that cooperation is more effective than competitive and individualistic efforts in promoting the discovery of high-quality cognitive reasoning strategies. (p. 91)

Group cooperation apparently outstrips individual level effort for complex issues because of the ability of the group to pool ideas, share resources, and correct errors. The mere presence of others is not enough to enhance individual achievement, however. If the individual receives little or no feedback from the group, then no significant gains can be expected (see Webb, 1982 on the need for feedback within groups). But unless there are incentives to involve all members, feedback cannot be assumed. As Slavin argues: "to expect students to altruistically care how much their classmates are learning is to ask a great deal" (1983: 441).

Most of the research on grouping and learning uses small groups. It might seem, then, that the findings about cooperation would not apply for an entire classroom. We propose that the generalizations have relevance at the classroom level; research that Cohen has conducted helps us make the case. Cohen has determined that the greater the percentage of students who talked and worked together, the great the gains made on the concepts and applications scales -- the higher level scales -- of the Comprehensive Test of Basic Skills (Cohen and Intili, 1981; and Cohen, 1984).

In summary our argument is as follows. The study of interaction warrants attention because of its potential contribution to the development of higher-order thinking among students. But whether interaction has widespread effects or influences outcomes for only a few will depend on certain characteristics of that interaction. Our task now is to identify the

dimensions which to us merit systematic examination if we want to see how and if benefits accrue to all students. The outcome of interest here -- the level of thinking -- is an individual, not a group phenomenon. We would regard interaction as effective only if its effects are similar across students. We are interested, then, not just in central tendencies -- the average score within a classroom on some measure of thinking, for example -- but also in the dispersion of results.

Dimensions of Classroom Interaction

When we speak of interaction we have in mind person-to-person, or social, interaction. The interaction can take place between teacher and student or among students. Patterns of interaction may vary, too, according to the extent of interaction, inclusiveness of the interaction network, symmetry of the interaction, and the degree to which "scaffolding" typifies the interaction.

Extent of interaction. For us extent of interaction has to do with the amount of time taken up by exchanges among the participants in the classroom. Not all activities within the classroom require person-to-person communication; individual seatwork is one illustration. But the evidence on cognitive development hints that interaction is what produces payoffs. We have cited some work which makes the point; an experiment which Perkins (1986) carried out reinforces it. Perkins has been interested in improving informal reasoning -- the kind of reasoning that occurs where premises are not fixed and inferences are not completely

reliable. The experiment we have in mind sought to improve the ability of a group of high school students to develop both sides of an argument by having the experimenter ask strategic questions and push on reasons given. Perkins reports that at the end of the experimental period, students in fact gave far more attention to both sides than they had at the outset. If interchanges make the pondering and exploration of issues possible, then we would expect that the greater the proportion of class time devoted to interaction, the greater the likelihood that higher order thinking will develop.

Inclusiveness of the interaction network. We assume that the interaction which occurs is patterned, that one can identify within a classroom those individuals who most frequently are involved in interchanges. We use "inclusiveness" to refer to the proportion of the class members whom the individuals comprise. Teacher-student as well as student-student interaction need not be equally likely for all members of a classroom, as the research on status and participation shows (see Cohen, 1984, for example). If interaction affects learning of higher order reasoning, then students who stand on the periphery may have less of an opportunity to hone their reasoning ability than would their better-situated classmates.

Symmetry of the interaction. Symmetry has to do with the degree of reciprocity in the exchange. Our interest in symmetry and its consequences for higher order thinking derives from several sources. The first is the suggestion that the traditional role relationships that appear in classrooms hinder reflective thought. Lochhead describes the

problem this way: "Teachers, who have the well-developed habit of explaining everything as clearly as they can, find it hard to hold back and let the students learn/discover for themselves. Yet, it is essential that they do this, if students are to take a more active role in their own learning" (p. 110). The second is the experience had with paired problem solving, where students take turns as reader-thinker and listener-critic. Reportedly, these exchanges -- which need not be limited to two persons -- succeed in part because demand equal status interaction (Sadler and Whimbey, 1985). The third is the finding that students might interpret instructional messages quite differently from the interpretation the teacher expects (Winne and Marx, 1982). The disjuncture between the intended message and one one received might disappear, if both sides have the right to probe, examine and translate. The importance of symmetry is hinted at in the discussions on opportunities for students to ask questions, and not just respond to teacher probes.

The asking of questions, the literature indicates, promotes and reflects thinking. It is not the mere asking of questions that is important but the nature of the questions.

> . . .cognitive growth is enhanced through disciplined inquiry that depends on the demand qualities of the questions. Questions which create discrepancies, pose contradictions, and require shifting of perspective are believed to have maximal impact on cognitive growth. In effect, questions that create a dialectical interaction are considered as prototypic of those that would have the greatest potential for influence (Sigel and Saunders, 1982: 184).

Advocates of discovery learning (e.g., Bruner, 1973; and Vygotsky, 1978) give question asking a critical role on the grounds that it allows one to broaden one's range. A common refrain is that in most classrooms students have too few opportunities to formulate and respond to stimu-

lating, challenging inquiry. The argument for a link between symmetry and reasoning is that the greater the reciprocity among the participants, the greater the willingness to participate in the exchange and the greater the exploration of issues.

Degree of scaffolding. "Scaffolding" has to do with the interweaving of ideas, with building a notion on the basis of a preceding one. When we speak of scaffolding we have in mind the degree to which the content of the exchange spirals, the tendency for the comments to link together. We noted earlier that Perkins managed to improve the reasoning of a group of high school students. He did so by scaffolding, by presenting the students with an issue which, once they had pondered it, would be followed by a deeper probe. The follow-through which the technique provides produced more elaborate arguments than the students initially had advanced.

The idea that learning is enhanced when knowledge can be organized and embedded is not unique to the notion of scaffolding. Apparently, the problems some children have with mathematics stem from their inability to place mathematical rules into any context, or to see any relationship between those rules and the arithmetic they use on a routine basis. Self-directed programs exist to help individuals make connections among the skills and ideas they aim to develop (Dansereau, 1985). But if the arguments on the importance of others are valid, we would expect interaction to be more effective than individual study as a means for identifying and understanding linkages in bodies of knowledge.

Links among the dimensions. Let us consider the possible relationships among the dimensions. We regard scaffolding as the pivotal dimension, the one with the strongest relationship to cognitive growth. Our reasoning is as follows. Scaffolding relates more closely to the knowledge that is to be transmitted than do the other dimensions. The remaining three describe the structure of the interaction, not the content. But no matter how symmetrical, extensiveness and encompassing are patterns of interaction, they cannot produce higher order thinking in the absence of an intellectual content. This is not to imply that scaffolding should be considered totally apart from the structure of relationships, however. If interaction consumes only a fraction of class time, then the degree to which scaffolding can occur -- let alone apex -- will be limited. Scaffolding offers the greatest promise where participants can explore together. Thus, the symmetry of relationships and the number to whom the relationships are open both represent important matters.

Let us now state explicitly the propositions that emerge from this analysis. For the outcome, higher order thinking, we are interested in two components: the level of such thinking, and the extent to which such thinking is found. With reference to level, we would treat complex thinking as a variable and not as a fixed phenomenon. Hence, we would expect individuals to display different degrees of complex thinking, and in seeking to test the propositions would develop measures that could take the gradations into account. The first component has to do with the place on a scale at which any given individual might be located.

The second component centers on the distribution of scale scores for a classroom. If the scores cluster towards the top of the scale, this to us would indicate extensive complex thinking.

> The greater the frequency of interaction in the classroom, the greater the likelihood of high levels of complex thinking, and the greater the likelihood that such thinking will be widespread.
>
> The greater the proposition of all students who participate in the exchanges, the greater the likelihood of extensive complex thinking.
>
> The greater the equality of the exchanges, the greater the likelihood of high levels of complex thinking.
>
> The greater the degree of scaffolding, the greater the likelihood of high levels of complex thinking.
>
> The greater the degree of scaffolding, the greater the frequency of interaction.
>
> The degree of scaffolding bears a stronger relationship to levels of complex thinking than do the frequency, inclusiveness, and equality of the interaction.

To this point our arguments have revolved around the relationships between interaction within the classroom and higher order thinking. We have done so primarily to establish the case for a closer examination of interaction and the conditions that make it possible. It is the set of conditions that will now engage our attention.

INTERACTION AND THE CONTEXT

Interaction that has the dimensions we have described may be more likely in some settings than in others. This section opens by considering the characteristics of the classroom that might be associated with the

dimensions; it moves subsequently to the school-level conditions that warrant attention. In most instances, the school-level conditions affect interaction only indirectly, through their influence on the classroom characteristics.

The Classroom as the Context for Interaction

Our examination of the classroom centers on three topics: the climate of the classroom, the resource-base for the classroom, and the structure of the classroom. We mean by climate the sentiment that prevails in the classroom. Our specific indicators of that sentiment are the quality of the relationships that exist and the norms held -- about the importance of interaction, the need for full-scale participation, and the allocation of roles. Resources have to do with the materials, knowledge, and rewards that are available in the classroom. Structure has to do with the way in which the participants are organized, with whether groups are used -- and, if so, the number of such groups -- as well as the use of any other system for stratifying or differentiating class members.

The climate of the classroom. We have chosen to emphasize the quality of relationships on the assumption that whether people will engage in interaction will depend on the level of trust and respect that exist. Support for the assumption appears in such sources as the research on organization development (see French and Bell, 1984) and models of leadership effectiveness (Fiedler, 1978). Within the research on schools are studies of student alienation (Cusick, 1973 and Willis, 1977) remind

us that few educational gains are made when students perceive little support from their teachers. If this has been found in the case of basic skills, there is no reason to assume that a different outcome would prevail for higher order skills.

One of the most consistent findings in the social science literature is that when people engage in regular relationships with one another, they tend to evolve norms: expectations about appropriate and inappropriate behavior. For classroom interaction, norms about the significance of interaction, the need for full involvement, and the allocation of roles may be especially significant. We know from past research on work groups that the extent to which participants cooperate with one another depends in part on the task: some tasks require interdependence. But the task alone cannot shape how cooperative even an interdependent group might be, and it offers no insight on the ways in which cooperation can come about where the success of individual performance may not hinge on group effort. It is useful, then, to inquire into the views held about cooperation and interaction. We have included norms about involvement because of the research that suggests its clear connection to classroom encounters. Frequently, students with high grades dominate the interaction that takes place. Morris (1979) has shown, however, that such domination can be prevented if specific norms for equal participation are introduced. Cohen has used the Morris model to bring lower status students into full participation. We introduce the third variable in light of the argument that student perceptions of appropriate roles in the classroom may help perpetuate traditionalism. In other words, it is not simply the

predisposition of the teacher that may determine internal classroom processes; the views of students can carry considerable influence.

Regularly, the research on teacher expectancy shows a positive association between the support teachers give to students and student performance. The support appears in the attitudes expressed, the actions taken, and the statements uttered (see Harris and Rosenthal, 1985 for their review on the studies on teachers and climate). We propose that students as well as teachers can shape the interpersonal climate in the classroom. We would expect that climate to be evident in the expectations held for participation, for student and teacher roles, as well as in the quality of relationships.

The resource-base. There is some evidence that the problems in teaching higher order thinking rest, not in the attitudes found within the classroom, but in the inadequacies found among teachers. This comment on physical science education applies to a range of subject areas: "Of particular concern is the apparent failure of universities to help precollege teachers develop a sound conceptual understanding of the material they are expected to teach" (McDermott, 1984: 31). An important resource for the classroom is the knowledge that the teacher possesses. Limitations in that knowledge clearly can affect interaction, but the more consequential effect is on the learning that can occur.

The materials represent yet another resource that may mold the classroom system. Some texts and scripted lessons allow only certain modes of presentation. Likewise, the rewards available can relate only marginally to the ends sought. To examine interaction -- its nature and

consequences -- analysts should keep in mind the parts that the knowledge of the teacher, the materials and the rewards all play.

The structure of the classroom. Classes vary considerably in their size and heterogeneity. Students can be arrayed in ways that promote classroom management but that need not build on clear-cut learning goals. There are two matters that interest us with reference to the structure of the classroom. We would want to know whether there is formal differentiation, whether officially the class is divided in some particular way. Where differentiation appears, our next concern would be: the basis of differentiation. Grouping could be based on a principle of heterogeneity, or on homogeneity.

According to some sources, students who are in heterogeneous or mixed-ability groups do not receive identical benefits. Hall (1982) reports that individuals gain from working with others of greater ability but not from interacting with persons of lesser ability. Yet, it cannot be concluded that low-ability students who are in heterogeneous groups will move closer to the performance of the high-ability students. The low-ability students may simply be given the answers and as a consequence might have little involvement in any collaboration. (Slavin, 1934). We derive our expecations about the effects of composition on outcomes, not from the arguments of Hall and Slavin, but from the study that Yager and his associates (1986) addressed explicity to the question. The analysts found that low- and medium-

ability students were particularly likely to benefit from participation in cooperative groups. Students at these ability levels did better when they worked cooperatively than when they worked alone. Nor did the high-ability students suffer any negative effects from the heterogeneity.

Context and Interaction

Having sketched the properties we would regard as critical at the classroom level, let us connect those properties to the dimensions of interaction. Two caveats are in order. We offer the relationships as hypothetical ones only; it is our assumption that empirical research would reveal these arrangements. We have tried to point out the relationships that are likely to be strongest; we not preclude other connections among the properties.

Of the attributes we have identified with classroom climate, two -- the quality of relationships and the norms about full involvement -- should relate to the extent to which the interaction that takes place is inclusive. Distrust or tension undoubtedly would limit the kinds of contacts persons would favor. But such contacts could also be limited where there are no norms that would overcome the tendency for informal cliques to operate or for certain students to remain on the fringes. A third attribute -- norms about the significance of interaction -- we would expect to find related to the extent to which interaction prevails in a classroom. Where there is support for cooperation, it is possible to

define tasks and arrange activities to allow such cooperation. But if individualism triumphs over group interest, it would not be difficult to see interaction as an impediment. The fourth climate attribute -- norms about appropriate roles -- should relate to symmetry. The rationale is clearest in the instance of teacher-student roles, for it would lead us to expect symmetry -- in the framing and answering of questions, in particular -- where this does not violate beliefs about responsibilities.

For the resource indicators, both the knowledge base and the materials we would expect to affect scaffolding. Scaffolding requires more than a superficial understanding of the subject area; moreover, it is easier to achieve when the materials used offer integrated, in depth examinations than when separate, brief treatments predominate. Obviously, the level of knowledge the teacher possesses and the types of materials that exist could matter for the extent to which interaction would be used as an educational strategy. Where the rewards relate to interaction, the most noticeable effect should be on the inclusiveness of the interaction network.

The most direct path from differentiation should be to inclusiveness. Grouping should providea wide segmentof the classroom the opportunity for some interaction, given the smaller number of people who would be a part of the network. But inclusive interaction in the heterogeneous group may be constrained, unless again the norm prevails that all should be involved. Although climate, resources, and structure represent significant features of classrooms, the climate -- particularly norms -- deserve special attention.

The resource base and the structure can act to constrain interaction: if the resources are inadequate or the structure rather cumbersome interaction may be circumscribed. Yet the addition of resources or the restructing of the class need not guarantee change. If, on the other hand, restrictions on interaction flow from the presence of unsupportive norms, one can envision a change in those norms as producing a change in interaction. The norms we have identified are not just potential barriers to interaction; depending on what prevails, the norms can be supports for interaction. Admittedly, if our argument is valid, those norms cannot produce the important component of interaction: the scaffolding or building of ideas and skills.

We can now present the hypotheses that link classroom conditions to the dimensions of interaction.

> The higher the levels of trust and respect within the classroom, the greater the likelihood of frequent, extensive, and symmetrical interaction.
>
> The clearer the norms for interaction, the greater the likelihood of frequent, extensive, and symmetrical interaction.
>
> The less structured the role expectations, the greater the likelihood of extensive and symmetrical interaction.
>
> The more knowledgeable is the teacher about the subject matter, the greater the likelihood of symmetrical interaction.
>
> The more structured the course materials, the less likely frequent interaction.
>
> Heterogeneity will produce frequent and extensive interaction if clear norms for interaction prevail.

To this point we have used the classroom rather than the school as the analytic unit, and have done so for two reasons. First, as we asserted earlier, for the outcome that is of ultimate interest -- the extent to which the student engages in complex thinking -- classroom con-

ditions should have more direct relevance than would school-level circumstances. Second, we could envision sharp differences within a school in the extent to which classrooms have the properties of interaction that we have emphasized. It would be difficult to explain such variation, based solely on school-wide forces.

There are arguments, nonetheless, for considering the school as a setting that can matter for classroom processes and outcomes. First, whether one finds within a school even a single classroom that is highly "interactive" may depend on the favorability of the school environment. Second, for such classrooms to be pervasive within a school, it may be necessary for the school to be a facilitator and not merely a passive force. In other words, this would require more than the removal of barriers; it would demand the construction of supports. We reflect in the next section on the school as an arena that would allow for classroom interaction and move in the next section to school-level factors which might promote the spread of the "interactive" classroom.

The School as the Context for the Classroom

For interaction as we have described it thus far, the classroom is the target setting. We move now to the level of the school to assert that classroom climate, resources, and structure may in turn be conditioned by the climate, resources, and structure of the wider school.

The climate of the school. Just as one may describe the atmosphere or climate of a classroom, so may a similar perspective be applied to the school. Indeed, one of the most popular views holds that an organization -- including a school -- is a system of norms for behavior, a unit held together by beliefs, myths, and rituals. This "cultural" approach has its roots in the work -- particularly from the 1940s and 1950s -- on informal organization. The work demonstrated that employees often

felt stronger ties to their work groups than they did to the larger organization, and in fact the norms of the group could conflict with those of the parent body (see particularly Homans, 1950; Katz, Maccoby and Morse, 1950; and Whyte, 1951).

Although the studies on informal organization helped spur an interest in the culture of organizations, it is a more recent development -- rapid economic growth in Japan -- that is the stimulus for the spate of discussions that have appeared over the past fifteen years. Organizational analysts who sought to explain that growth located it in the dynamics of the firms; these analysts reported that Japanese firms differed in several respects from Western firms and concluded that the differences mattered for economic growth (see, for example, Pascale and Athos, 1981; and Rohle, 1974). Subsequent analyses proposed that the Japanese case could be replicated, for fundamentally it showed that success depends on a system of values (Ouchi, 1981, 1984; and Ouchi and Wilkins 1985). The interest in values has produced a flood of books on the culture of successful American companies (Peters and Waterman, 1982; Deal and Kennedy, 1982; and Tichy, 1982).

One can find in the literature on school effectiveness an interest in the importance of school-wide norms. But let us turn to the work on higher order thinking, for there, too, the issue of culture appears. Resnick remarks as follows:

> A widely shared set of implicit assumptions exists about how dispositions for higher order thinking might develop. They center on the role of a social community in establishing norms of behavior, providing opportunity for practice, and occasions for learning of particular skills. The fundamental theme is that such dispositions

> are cultivated by participation in social communities that value thinking and independent judgment and that communicate this by making available many occasions for such activity and responding encouragingly to expressions of questioning, judgment, and the like (p. 51).

The norms -- about the importance of interaction and the need for widespread participation -- that we identified at the classroom level may be operative at the school level as well. We contend that the greater the support for these norms at the school wide level, the greater their role at the classroom level. The Resnick discussion isolates other norms that may be particularly appropriate at the school level: norms that stress independence of judgment and the importance of taking a questioning stance. These norms have to do rather directly with higher order thinking; their effects need not be mediated through classroom interaction processes.

The quality of relationships in the school deserves consideration. As Resnick and others have suggested, the fostering of higher order thinking appears to have the greatest chance where there is community support. Such support lends status and validation to efforts, outcomes of import when the efforts center on so risky and rare a matter as the promotion of higher order thinking. The character of the school climate does not depend only on the relationships teachers have with one another. Students make a difference, too. We know from the research by Goodlad (1983) that in some schools students offer more favorable assessments on the climate than obtains in other situations. There should be a positive correlation between the quality of relationships, as perceived by teachers and students, for the school as a whole and the quality found for a class-

room.

The resources of the school. As in the case of climate, the resources we have identified for the classroom have their counterparts at the school level. But for some resources, the school is the appropriate unit to consider. Whether or not the teacher has the knowledge and management skills to engage in scaffolding can depend on the training and informational sources that the school has made available. The financial resources may represent yet another important influence on what can be done within the classroom.

The structure of the school. We can think of a school as a formal organization that has a system for making decisions, a division of labor, patterned communication, and formal rules and procedures. Some of these appear to bear rather directly on conditions in the classroom; others have a more remote connection.

The work on effectivenes raises interesting possibilities about the decision making-student outcome nexus. Rutter's research in a set of British high schools found that teacher participation in decision making made a difference for student performance. "Pupil success was greater in schools where there was the combination of leadership with decision-making at a senior level, and a decision-making process in which all teachers felt their views were represented and seriously considered" (1980: 218). Interestingly, Rutter does not limit his attention to teacher participation; he cites as well the consequences of student involvement, noting that where students held positions of responsibility within the school system, they were likely to identify with the system's objectives.

Thus, where teachers and students can exercise some influence in the larger system, they are likely to evince concern about performance at the classroom level. We cannot equate performance in the classroom or "success" as Rutter measured it with an emphasis on higher order thinking. We believe it reasonable, nonetheless, for researchers to consider the possibility that some structures of decision making offer more inducement for the interactive classroom than do others. The structures cannot cause such a classroom to emerge; they may, however, allow it to continue and prosper, once it has developed.

The information on division of labor also tends to be indirect, if we seek to relate it to classroom processes. The successes Sadler and Whimbey report regarding strategies for improving cognitive skills hint that too much specialization can prove problematic. The observers report on two schools in which teachers operate on teams and attend workshops together and contend that such interaction follows from their conclusion that a focus on cognitive development must be a cooperative, group venture.

But the Sadler-Whimbey discussion is more implicative for the matter of communication than it is for the division of labor. The two schools referred to above have coordinated teachers' schedules so that they can have time together, time to visit one another's classes and discuss teaching strategies.

Communication among teachers can help make the school a conducive environment for cognitive development. Schools may allow for teacher-

teacher communication or actively promote it, as illustrated by the coordination of teaching schedules. Communication can be helpful, even if it is not designed explicitly to help teachers improve their skills. Interactive classrooms can appear to an observer as "ragged around the edges," as poorly organized. Unless the teacher informs others of the nature and direction of the class, a rather negative image might emerge. To reduce this possibility of unwarranted criticism -- and to garner useful suggestions -- the teacher may find some communication with peers and superiors invaluable. If staff interaction occurs only infrequently, then misunderstandings about unusual classrooms would not be surprising.

Structure may have an independent influence on the classroom processes that we have linked to interactional characteristics. We suggest, however, that the relationship that structure has to climate perhaps is the significant one. The patterns of decision making, the system of rules, and the nature of communication may reflect and condition norms for involvement and expectations about behavior.

At the level of the school, as at the classroom level, the climate or culture may be the area that merits particularly close analysis. We hope, nevertheless, that research would take account of the full array of variables and relationships we have combined into an overarching framework (see Chart 1.)

CHANGING THE ORGANIZATION

If schools with interactive classrooms -- designed to enhance cognitive

growth -- represent an anomaly, how can they be encouraged? This issue draws our attention in our concluding remarks on the context of higher order thinking.

Organizations and Resistance to Change

Broad-based change takes place rather infrequently in formal organizations. For one reason, the investments that organizations have made in current procedures and structures make them reluctant to move to unchartered territory. For another, movement may require far more consensus than can be mustered. In the face of dissensus, inertia results. Organizations do change, however.

It appears that change comes about primarily because of pressures; the sources for changes in educational organizations in particular appear to be external. Interest group pressures and emerging society issues are more common sources of change in schools than are deliberate plans and initiatives developed by boards and administrators. Pressures for change may provide insiders with the opportunity to tread new paths; in other words, the failure for change to emerge internally does not imply resistance in all cases to any modifications.

Guiding the Change

The work on innovation is relevant, for the introduction of strategies to promote higher order thinking would be innovative, and the discussions of innovation offer interesting comments on the positive responses that pressures for change can produce.

We find the description that Van de Ven presents to be a useful working definition of innovation: "The process of innovation is defined as the development and implementation of new ideas by people who over time engage in transactions with others within an institutional context" (1986:591). The definition covers technology as well as administrative arrangements. The introduction of more interaction in the classroom involves changes in content and the approaches to knowledge in addition to changes in procedures. At the level of the school, the spread of the interactive classroom would have its impact primarily on administrative arrangements.

It appears that innovation depends to an extent on visionaries, visionaires who persist even when there is little initial support or enthusiasm. We refer to the visionaries as the "leadership element," an element that may be draw from anywhere within the organization. The leadership element serves primarily to manage attention, to engage participants in analyses on how new ideas may be implemented.

We have not intended here to present a full-blown analysis of the role that leadership can play. Although we do intend to pursue at greater length the nature and emergence of leadership in the innovation process within organizations, our primary interest centers at present on the development of a conceptual framework for linking classroom conditions to school organization. We have argued, first, that the study of higher order thinking in classrooms might profitably pay attention to the interaction which occurs. We have chosen to focus on interaction because it more closely represents a classroom than an individual level

variable. We have maintained, next, that interaction should be treated as a dimensional concept whose dimensions can be specified and measured. Our argument assumes that the classroom is the relevant setting for examining teaching and learning; but it assumes as well that conditions within the classroom -- and especially the nature of the interaction that obtains -- may depend on the kind of environment the school represents. The three categories of school-level variables -- structure, cultures and resources -- seem to us as significant ones, given the limited work on the social ecology of higher order thinking and the more extensive research on organizations. We do not maintain that all three categories are equally important, or that the variables in each category would carry equal weight. Our aim is to highlight the areas for which further refinements seem likely to have payoffs.

FOOTNOTES

1. We realize that we have not offered an operational definition of the concept, "higher-order thinking." We intend to continue to develop the arguments in this discussion and in so doing will consider explicity the operations that could be followed for determining the level of thinking in which a student engages.
2. See Harris and Rosenthal for elaboration on this point.

Chart 1. Variables in the Model

SCHOOL LEVEL VARIABLES	CLASSROOM LEVEL VARIABLES	INTERACTION OUTCOMES	COGNITIVE OUTCOMES
Climate	Climate	Frequency of interaction	
Level of trust	Level of trust		
Expectations for participation	Expectations for participation		Level of complex thinking
Support for independence	Flexibility of role expectations	Extensiveness of interaction	
Support for questioning			
Resources	Resources		
Availability of expertise	Level of teacher knowledge	Symmetry of interaction	
Availability of finances	Flexibility of material		Extent of complex thinking
Structure	Structure	Degree of scaffolding	
Openness of communication	Degree of differentiation		
Openness of decision-making	Degree of heterogeneity		

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